

## REVIEW.

ART. XI. *An Inquiry into the Principles and Practice of Medicine, founded on original Physiological Investigations.* By G. CALVERT HOLLAND, M. D. Physician to the Sheffield General Infirmary.—*Quandò talis amentia et abusus cessaturus est? et quandò aurea mediocritus et sobrietas in territorio medicorum triumphatur?*—SCHMIDTMANN. Sum. Obs. Med. London, 1834. Vol. I. 8vo. pp. 540.

THE above volume is the commencement of a series of investigations, the object of which is, as the author expresses it, in his preface,—

“To endeavour to march up directly to the capital or centre of medical science,—to a knowledge of the general functions of the animal system in health, and of the particular mode of their disturbance in disease.”

The present portion of the Inquiry can be viewed, however, only as a general introduction to the system of physiological pathology and therapeutics, which it is the intention of Dr. Holland more fully to elucidate in the volumes which are to succeed. Hence, on some of the most important points connected with the subjects of which he treats, Dr. H. has thrown out merely a few leading hints, and even when he enters into a more extended exposition of his opinions, constant reference is made to subsequent details that are essential to a correct understanding of them. It is scarcely possible, therefore, from what he has furnished in the volume before us, to present such an account of his peculiar views on the principles of medicine, and the chain of reasoning by which they are supported, as would be in all respects just to him and satisfactory to our readers. In order to do this, it would be even necessary before considering the contents of the present volume, to enter into a very full examination of a previous publication from the pen of the same author; we allude to his experimental Inquiry into the Laws of Organic and Animal life; for upon the physiological doctrines set forth in that work much of the pathological reasoning of Dr. Holland in this is based. All, therefore, that we can now attempt, is simply to offer a brief sketch of the leading opinions advanced by our author, with the hope, that at no distant period we may be better prepared to enter into an examination of their merits.

It is very evident from the work under review, as from most of those which have recently issued from the medical press of Great Britain, that the pathological as well as therapeutical views of the physicians of that country are undergoing a rapid and very important revolution. The ontological systems which they have cherished for so long a period, are fast giving way, while they are every day becoming more convinced of the importance of physiological medicine. To its leading truths many of the most distinguished among them, both for talents and experience, have already become entire converts. The necessity of correct physiological views, as the only certain foundation for a sound system of pathology and practice, is now almost universally acknowledged. The different organs and tissues of the body are now studied individually, both in their healthy and diseased conditions; and their reciprocal influence in the production of the phenomena of health and disease, carefully and cautiously traced; and although in too many instances even they who have adopted this more philosophic and certain plan of arriving at medical truth, fall far short of attaining their object, yet the numerous important facts and principles to which it leads have already produced a very striking and beneficial influence upon almost every department of the healing art.

"Physiology," remarks Dr. H. "if properly cultivated, will give us clear notions not only of the animal economy in a healthy state, but of the various phenomena succeeding its derangement, the nature and causes of disease, and the operation of remedial agents. Although the study of this science has yet thrown but a partial or dubious light on these and other matters of equal importance, we are not, therefore, entitled to conclude that it will not, in future, more clearly elucidate them, since it is not difficult to point out the causes which have hitherto limited its utility, and the errors into which preceding physiologists have fallen. p. 41.

"Little dependence can be placed on any inferences drawn from observation and experience in medicine, unless they are made under the more enlightened direction of physiological knowledge.

"From the intimate connexion that exists between the well established principles of physiology and pathology, it is evident that these sciences mutually reflect light on each other, and that a knowledge of both is necessary to corroborate and confirm what is true in either of them. p. 64.

"The pathologist who, in the investigation of disease, conducts his inquiries in the just spirit of philosophizing, first makes himself acquainted with the functions of those organs, or parts of the body, the disorders of which he intends to examine, and in order more surely to arrive at truth, forms an intimate acquaintance with the natural powers of the animal economy. But how rarely have these indispensably preparatory steps been taken by those who have studied the nature of diseases! Led to the investigation of them by the accidental

success which has followed a certain plan of empirical treatment, or by traces of disorganization observed, on dissection, in some particular organ, their object has seldom been to ascertain the principal laws of the system in order to gain correct views of the origin and character of local or general affections." p. 65.

The foregoing remarks are not less important than strictly correct.

We need not be surprised when we find the English physicians becoming thus more thoroughly impressed with the necessity of a physiological investigation of disease, that they should begin also to view in a more favourable light the writings of BROUSSAIS. Although the majority of them are still very far from adopting, to their full extent, as established truths, the peculiar views of the latter, yet we find them in fewer instances than formerly, denouncing those views as mere visionary hypotheses, either useless or dangerous in the results to which they lead. On the contrary, the real services which that distinguished professor has conferred by his writings upon medical science, in pointing out the only correct method of investigating disease, is at length very generally, though often reluctantly, acknowledged.

Dr. Holland, after noticing the undeserved reputation which the *Study of Medicine* of Dr. Good has acquired in England, remarks as follows:—

"It is scarcely possible to conceive a greater difference, so far as regards the extent and accuracy of physiological and pathological principles, than that which exists between the medical works of Broussais and the 'Study of Medicine.' The former display an enlarged and generally correct knowledge of the natural laws of the animal economy, and the origin of the diseases, of which they treat: and it may here be observed, that physiological and pathological views are in them so intimately connected, that a close attention to both is absolutely necessary, without which it would be impossible to understand the mode of treatment recommended by Broussais, and his explanations of the operations of many important remedial agents.

"It must not, however, be understood from these remarks, that he has laid down principles so extensive as to explain the manner in which the numerous external and internal causes influence the more vital functions, how the disordered action of one disturbs the rest, or the precise mode in which many of the curative means affect the powers of life: still less is this general praise to be construed into an approval of his particular notions respecting the seat, nature and treatment of various diseases. It must, however, at the same time, be acknowledged that the works of Broussais are disfigured by fewer errors than most others on subjects connected with the science of medicine. They abound in facts of inestimable value—in reasoning generally clear and philosophical, and in incidental remarks, such as could proceed only from a mind endowed with original powers of no ordinary character." pp. 25, 26.

In a subsequent part of the work, Dr. H. notices the treatise on

chronic inflammation, by the same author, with the remark that, "with all its faults it is unquestionably one of the most valuable medical productions of the present age."

We must concede the credit to Dr. Holland of having pursued the correct road in his inquiry into the principles and practice of medicine. Much of that praise may with great propriety be bestowed upon his pathological deductions, which he so freely concedes to those of Broussais; namely, that they are based entirely upon physiological principles, with which they are so intimately connected, that generally speaking, the correctness of the first must be admitted, provided that of the latter be clearly established. Although we profess not to criticise doctrines which the author has only partially developed, we fear, nevertheless, that in very many particulars neither his physiology nor pathology will bear the test of a very strict scrutiny.

The main propositions which Dr. H. appears to be desirous of proving in the inquiry before us, and upon which nearly the whole of his pathological reasoning is evidently built, are as follows, namely:—

1. That the blood is the great vital agent by which all the phenomena of health and of disease are mainly produced.
2. That all the deviations from health and the modifications of morbid action to which the human organism is liable, are the result of changes, more or less extensive, in the properties and distribution of the blood, and—
3. That all our remedial agents produce their effects by acting upon the blood either directly or indirectly, so as to improve its properties or to restore its healthy distribution throughout the different parts of the body.

Dr. H. must not, however, be considered strictly a humoralist. His object appears rather to be that of combining in one system both humoralism and solidism.

"Although," he remarks, "it is incorrect to refer the origin of all diseases to alterations in the qualities of the blood, it is, nevertheless, easy to adduce numerous facts and striking illustrations to prove, that many of the maladies with which the human frame is affected, if not the greater number, are to be traced to this cause. The solidists, who contend that diseases originate in alterations of the animal structure, deviate almost as widely from the truth as the humoralists, and although the doctrines they teach are characterized by fewer absurdities and assumptions, they yet exhibit the same limited knowledge of the more important functions of the body, a thorough acquaintance with which is as essential to the establishment of their own principles, as those of the humoralists. In consequence of their ignorance of these vital functions, (an intimate and accurate knowledge of which can alone explain the cause of any morbid effects in

the system, or suggest the means by which they may be removed,) it is impossible for them to understand how diseases of structure influence the qualities of the blood, or how any disorder in it is the occasion of functional and organic derangements." pp. 7, 8.

To the influence of the blood Dr. H. refers in a great measure, if not entirely, that important agency in the production of the vital actions of the body, which most other physiologists ascribe to the influence of the nervous system. Thus, he remarks, page 301,—

"Digestion, circulation, nutrition, absorption, exhalation, and secretion, are all equally dependent on a healthy state of the blood for the correct performance of their respective offices; since every decided derangement of it invariably gives rise to corresponding alterations in these functions."

Now, although the truth of the foregoing proposition will scarcely be denied by any one, yet it is evident that our author intends to express by it something more than that healthy blood is one of the requisites to the perfect performance of the functions referred to. This will be seen from the following passage:—

"As the blood is the source from which all secretions are derived, and as it contains all the properties essential to the operation of the complicated powers of life, every serious derangement of those properties will necessarily produce morbid effects in the system, either local or general, proportionate to the extent of the deviation of the sanguinous fluid from a healthy condition." p. 299.

The important part assigned by the author to the blood in the production of nearly all the phenomena of the living organism is more clearly shown by his remarks upon the nervous system.

"On the nervous system," he observes, "since the time of Cullen, many ingenious minds have attempted to establish doctrines that have been supposed to unravel some of the great mysteries of the animal economy, such as the principle of life, the function of secretion, the influence of the maternal imagination on the *fœtus*, the origin of disease, the manner in which the emotions of the mind affect the body, the influence of all sympathetic actions, and various other phenomena. Our knowledge of the nervous system is extremely limited. We cannot say, even in a single instance, how any of its respective functions are performed. We know that motion and sensibility are properties with which it is endowed, bestowed in various proportions on different parts of the body, according to the structure and function of the organ to which they are given,—and, we also know, that the five senses, and the intellectual faculties, perform their several operations by or through the instrumentality of this system. We are, however, in possession of no facts which prove that secretion, digestion, or assimilation is directly dependent upon it, or that it in any way directly contributes to the exercise of these powers. It is generally supposed, and by some broadly asserted, that the ganglionic system of nerves, in consequence of the numerous organs to which its ramifications extend, occasionally produces considerable internal disease, spreading from it, as from a centre, to the contiguous

viscera. No satisfactory evidence, however, is adduced to prove that it exerts the degree of influence attributed to it. There is not, indeed, one fact which plainly demonstrates the existence of any such influence, or renders it even probable." pp. 15, 16.

"A knowledge of the influence exercised on the vital powers by changes in the properties and distribution of the blood," he remarks again, p. 70, "renders it highly probable that the nervous system is a much less extensive agent in the animal economy than has hitherto been imagined."

"The circulatory system may be considered as uniting in one common bond the animal economy, so as to render it impossible that any one part of it should be influenced to a considerable extent, without immediately deranging the laws which regulate the whole." p. 400.

Dr. Holland explains, in fact, nearly all the sympathies, whether healthy or morbid, by the influence solely of the blood.

"I have endeavoured to show," he states, "in the 'Experimental Inquiry,' as well as in the 'Physiology of the Fœtus, Liver, and Spleen,' that numerous sympathetic affections which have been attempted to be explained by the supposed action of the nerves, are much more simply and satisfactorily accounted for by that of the sanguiferous system." p. 67.

"The heart, instead of being affected through the brain by the nervous, is acted upon by the sanguiferous connexion existing between these two organs." p. 60.

"If cold be suddenly applied to the surface of the body, and inflammation of the bowels be the consequence, this effect is not produced by any sympathy between the capillaries of the diseased organs and the superficial ones primarily affected; all the changes caused in the constitution of the former, being wholly attributable to the determination of blood to them, arising from the diminished distribution of it on the surface of the body." p. 136.

"When the body perspires freely from exercise, or excessive heat, the biliary secretion is increased; a fact which is generally adduced to prove a sympathetic connexion between the liver and skin, the excited action of the latter being accompanied by a similar excitation in the former. The co-existence of these two circumstances has led physiologists to regard one as a cause, and the other as an effect. In support of this hypothesis, it is further stated, that when the surface of the body is constricted by cold, the secretion of bile is diminished."

"The secretion of bile, as well as all other secretions, is derived exclusively from the blood, and it will, consequently, be liable to be affected by all modifications in the properties and distribution of this fluid." "Artificial heat, or the general warmth of summer, occasions alterations in the diffusion of the blood calculated to facilitate its chemical changes in the lungs. Perspiration is simply the effect of the increased production of heat. The more general distribution of the vital fluid, and the strong and accelerated pulse, are attributable to the improved qualities of the blood; and to this cause we must also refer the augmented secretion of bile. The liver participating in the general conditions of the sanguiferous system, is necessarily stimulated, and the various modifications occurring in its functions are, consequently, in harmony with the evident causes in operation." "Exercise accelerates the circulation, and facilitates the natural

changes of the blood, and hence we are entitled to expect the same results from the influence of like causes in operation. When cold is applied to the surface of the body, the capillaries are constricted, and the blood is determined to the internal organs, so that the ordinary chemical actions in the lungs are impeded, and the blood is less completely oxygenated, causing the secretory functions of the liver to be proportionately depressed or deranged." pp. 339, et seq.

Physicians have so long been accustomed to regard the nervous system as the chief agent in the production of all the phenomena of life, and as the part of the animal system, which is the first to suffer from the various morbid causes to which any portion of the latter may be subjected, as well as the principal medium through which diseased action is transmitted from one organ to another, that most of our readers will no doubt be startled at the boldness with which Dr. Holland denies to it, that important office and influence. When, however, the whole of his arguments are cautiously examined and duly weighed, we are persuaded that the opinions of our author on this subject, however heterodox they may at first sight appear, will be found by no means destitute of probability. Too much has unquestionably heretofore been ascribed in works on the institutes of medicine to the agency of the nervous system, both during health and in disease. We differ, it is true, from Dr. H. in the mode of explaining the production of many of the vital phenomena to which he refers, but nevertheless fully concur with him in ascribing them to other causes than mere nervous influence.

The remarks of our author upon the sympathetic nerve and par vagum are in the highest degree interesting; we have room, however, only for a very brief notice of them. In reference to the great sympathetic, he remarks—

"The generally ascertained functions of the cerebro-spinal apparatus do not appear to be at all necessary to foetal existence. The intimate connexions formed with this apparatus by the sympathetic nerve, are for the purpose of maintaining relations and ministering to powers evolved only at birth; the seeming complexity of these connexions is therefore intended to answer ulterior, and not immediate ends. On this principle we may, perhaps, explain the functions and origin of the sympathetic nerve. It does not appear just, to consider it as arising either from the brain or spinal cord, if that portion of it strictly belonging to foetal existence be regarded as a part of the nerve, which is stated by high authorities to be first formed; and indeed, if it be examined in all its complex relations to a more perfect state of being, the whole nerve cannot be looked upon as springing from the cerebro-spinal apparatus, but only that part of it which is evolved to maintain these complex relations. Hence the sympathetic nerve may be said to have as many origins as it has distinct connexions with the rest of the nervous system; keeping, however, in mind

that the greater part of it has an independent existence, viz. that part which is always found even in the least perfectly constituted *fœtus*, and which, in the confined sphere of its being, is alone necessary. Its numerous connexions with the brain and spinal cord, but especially with the latter, afford an abundance of nervous energy appropriated to the purposes of motion and sensibility, which its own independent system is altogether inadequate to supply; and it is in consequence of such connexions becoming more intimate and various in the ascending scale of animal life, as well as in beings of the same species, in passing from birth to a fully matured age, that any injury inflicted on these organs is liable to destroy or severely implicate the vital functions. The connexions thus established, not only afford the viscera additional nervous power, but likewise become the media by which morbid impressions are transmitted to the sensorium, rousing it to a consciousness of existing mischief, or otherwise affecting its sensibility. The ganglia of the sympathetic nerve are considered by many as rendering the important actions of organic life independent of volition. There are no experiments which prove this; nor is the reasoning adduced in its favour in any degree supported by facts; but there can be no doubt, that such actions are not under the direct influence of the mind, though it must be acknowledged, that the cause of this independence is involved in mystery."

"From the limited sensibility exhibited by the abdominal viscera in a state of health, it is natural to infer that the sympathetic nerve is not endowed with a high degree of it, and in corroboration of this inference, it may be shown that it is more extensively associated with the anterior roots of the spinal nerves which excite motion, than with the posterior, which excite sensibility. The constant contractions of the heart, and of several of the abdominal viscera, require that these organs should be abundantly furnished with nervous energy exciting motion, but not equally with that exciting sensibility, as the latter is by no means so necessary to enable them to perform their proper functions. The distribution of the cerebral nerves, and their connexion with the sympathetic nerve, explains the acute sensibility which the abdominal viscera occasionally manifest in disease, as well as the reciprocal influence which they exert on each other; it is not however improbable, that this reciprocal influence has been used to explain phenomena which are justly referable to other causes." pp. 449, et seq.

Dr. Holland conceives that in order to explain the cerebral engorgement and consequent tendency to sleep which follow fatigue, it is unnecessary, with Broussais, to refer them to the direct influence of the sympathetic nerve.

"All muscular exertions, he remarks, enfeeble the animal system by the exhaustion of its vital energies, and when this is considerable, the internal organs necessarily lose some portion of their vigour, so that the blood is propelled neither with its usual force, nor in its ordinary quantity, from the centre to the circumference of the body, in consequence of which the brain, as well as all other important viscera, are liable to be congested, independent of any influence being exercised by the sympathetic nerve." "Fatigue may arise from other causes besides muscular exercise, as from deep and continued thought, or close application to any sedentary pursuit. In cases of this kind, the internal engorgement which succeeds lassitude, cannot justly be attributed to an

excessive impoverishment of the system, such as occurs after violent exercise, because the excited action of the functions which occasions this impoverishment in the one instance, does not exist in the other. There is undoubtedly a certain degree of it; but the fatigue which is felt, is not so much caused by this, as by the constrained position of the body, and the want of muscular motion essential to the healthy distribution of the blood, and the vigorous performance of the numerous vital actions." p. 455.

We cannot enter at any length into an examination of the author's reasoning in relation to the functions of the eighth pair of nerves. He conceives that by experiments it has been unequivocally demonstrated that these nerves are endowed with the property of exciting motion, but that nothing has been adduced which so decisively proves that they possess the power of exciting sensation. Hence it will be perceived, that he denies that the changes produced in the air inspired by the lungs, or in the food by the stomach, are immediately dependent upon the influence imparted to these organs by the par vagum.

Direct experiments are adduced by BRACHET to prove that these nerves are essential to the sensation of hunger and satiety. When they were divided in animals that had been kept many hours without food, a tube being introduced into the trachea in order to maintain the respiratory function, he states, that the animals no longer manifested the feeling of hunger, which he considers as proved, not by their *refusing to eat* the food that was offered them, but by their not seeking it. In experiments performed by Dr. Holland, some years ago, for the purpose of ascertaining the influence of the nerves in question on the function of digestion, many of the animals, he states, in a short time after the operation, frequently ran about the room, as if in search of food, though in general they were little inclined to move.

"But even admitting," he adds, "that they are dull and inactive, it does not, by any means, seem just to infer that they have lost the feeling of hunger because they do not seek their food." p. 424.

"A severe wound inflicted on any part of an animal, renders digestion difficult; and the same injury will, also, greatly lessen the sensation of hunger previously existing, not because there is any direct change produced in the functions of the stomach and the eighth pair of nerves, but because other and far different feelings are excited in the mind—feelings which, in proportion to their energy, modify the sensations of hunger." p. 425.

A series of experiments are detailed in the work before us, which prove, beyond all doubt, that the division of the nerves does not destroy the desire for food, nor even diminish it in any perceptible degree, during a few hours subsequent to the operation. They like-

wise prove, contrary to the assertion of Brachet, that the division of the par vagum does not destroy the feeling of satiety, but that the distention of the oesophagus with food, which occurs subsequent to the division of the nerves, and upon which Brachet founded his opinion, is dependent upon a paralysis of the oesophagus, in consequence of which it is incapable of conveying the food into the stomach.

The division of the eighth pair of nerves is by many supposed to arrest the function of digestion, in consequence of the influence of these nerves being withdrawn from the stomach. Dr. H. believes, however, he has proved that the suspension of the digestive function is not produced by this cause, but by the disturbance of the circulatory system; for when the natural conditions of this system were maintained after the division of the nerves in question, the function of digestion still continued to be properly performed; thus showing that the nervous connexion between the brain and stomach is not essential to the process of digestion, nor of secretion.

In the opinion of our author, experiments clearly prove also, that the division of the eighth pair of nerves does not destroy the contractility of the muscular fibres of the stomach, nor of the air cells of the lungs, since the lungs and the stomach both continue to perform their respective functions long after this operation.

"The organs in which this contractility resides, derive nervous energy from other sources besides the eighth pair of nerves, and this power, for any thing we know to the contrary, may depend less on such influence than on the inherent and independent properties of the muscular fibres themselves. Admitting that the par vagum excites motion wherever it is distributed, the degree which it produces in many organs may be so trifling, that no serious and immediate injury may be occasioned in the vital operations of the system by the division of the nerve. Its chief function may be to associate in harmonious action various parts of the animal frame, so as to secure its permanent well being, though this association may be of such a nature as not to be immediately apparent on its interruption." p. 444.

As we have already remarked, Dr. H. refers the production of all diseases to morbid alterations occurring in the properties or distribution of the blood, and as the blood undergoes extensive changes whenever the organs, which influence the circulation, are disturbed in their actions, consequently an acquaintance with the author's views in relation to the sanguiferous system, and the laws by which it is regulated, will be essential to the proper understanding of his pathological and therapeutical doctrines. Into an examination of these views, it is impossible, however, for us to enter fully at present.

The sources of the propulsive powers of the blood are, he remarks,

the heart, the capillary system, and the changes in the capacity of the lungs.

"The muscular motions of the body, which are, indeed extremely numerous, accelerate the flow of blood, but as they are only occasionally, and not unremittingly excited, they cannot justly be enumerated among the permanent causes of its circulation; their influence, however, should be always carefully kept in mind, as it will often be adviseable to excite or suspend them in the treatment of diseases. Some eminent physiologists believe that the capillaries and the changes in the capacity of the lungs, exercise little, if any, direct power on the circulation of the blood. I am, however, disposed to think, that it is possible to bring forward decisive evidence in favour of the agency of the former—evidence which appears entirely to subvert the supposed conclusiveness of experiments adduced to disprove such agency, and the influence of the latter can scarcely be denied, if we impartially weigh the strong facts adduced in its support.

"A better understanding of the functions of the capillaries will certainly lead to more correct views of the origin, nature, and treatment of diseases. To endeavour to ascertain the functions of these vessels, the manner in which they are acted upon by various external and internal agents, and the way in which such action affects the powers of life, is an undertaking replete with interest, and, if successfully pursued, will be attended with the greatest benefits.

"It will scarcely be questioned that the blood is propelled chiefly by the heart, since every invigorated action in it is the cause of the better oxygenation of the vital fluid, a process which, in its turn, gives greater force and frequency to the contractions of this organ; whilst an opposite condition of the heart is accompanied with contrary effects. The action of the heart may be influenced either directly or indirectly,—*directly* by whatever is conveyed to the heart, whether of a stimulating or sedative kind, in the course of the circulation, or through the nerves and vessels connected with it, in which manner galvanism and electricity may be supposed to operate in part, when applied in the immediate vicinity of the heart; *indirectly* by whatever affects the properties or distribution of the blood." pp. 56, et seq.

The distribution of the blood, according to Dr. H. is modified by the disturbed action of the respiratory organs, whether arising from coughing, vomiting, nausea, sighing, laughing, or speaking; also, by the application of external and internal stimulants and sedatives, the latter not acting directly upon the heart; by injuries inflicted upon the cerebrum, obstacles to the circulation, bleeding, purgatives, the removal of pressure from the abdominal and thoracic viscera, and other causes which it is not necessary here to particularize.

The modifications occurring in the properties of the blood, as our author very properly remarks, have not hitherto formed a subject of particular investigation; and the agency of the blood in the production and extension of morbid phenomena has consequently not

been clearly understood. Modifications in the blood have, it is true, been frequently observed in diseases, and allusions have also been made to them as characteristic of the nature of the morbid affections.

"But all the research and ingenuity of physiologists have yet thrown scarcely any light on their origin and influence, which cannot indeed be at all comprehended without a previous knowledge of the causes which affect the qualities of the blood. A knowledge of these causes will lead to a correct estimate of the relative value of the powers of life, and when this is ascertained, those which are known to exercise the most extensive controul will be easily investigated. *Respiration* may be justly regarded as the most important of these powers, and ought accordingly to receive the first consideration. The various actions of the animal economy are more immediately and more extensively disturbed by the derangement of this function than perhaps of any other.

"If respiration is impeded, the chemical changes in the lungs are imperfectly performed, and blood destitute of healthy, stimulating, and nourishing properties is consequently diffused throughout the body, occasioning much general and local disease; but if, on the contrary, it is unduly excited, the changes are proportionately increased, as blood too stimulating in its properties is circulated, producing both local and general disorder, though of a very different character from that which succeeds a depressed state of the sanguiferous system." p. 299.

Deviations from the healthy condition of the blood produce corresponding alterations in the functions of digestion, circulation, nutrition, absorption, exhalation, and secretion. It is easy, therefore, our author remarks, to appreciate generally the nature of the connexion existing between respiration and these several vital powers.

"Whether," he adds, "the deterioration in the qualities of the blood succeed the influence of external agents—of depressing emotions—of injuries of the brain—or of impediments to the circulation in the heart or lungs, it is to be traced to alterations in the quantity of the vital fluid, submitted at any one moment to the action of the inspired air; for these various causes are all capable of disordering the natural relation existing between the proportion of blood in the lungs and the atmospheric air which is inhaled.

"The modifications in the properties and distribution of the blood cannot, however, be justly ascribed to the derangement of the respiratory function solely, when that derangement is of long continuance, since in that case, they are partly produced by disease of the different organs which contribute, either directly or indirectly, to the production of chyle; for if this fluid is deficient in its ordinary nourishing qualities, the arterial blood will necessarily experience a deterioration, although the conditions of the respiratory organs, essential to the chemical changes of the blood, may at the same time be only slightly affected."

"A morbid condition of the digestive organs occasions disease in every part of the body, especially in the nervous system, the disordered state of which is indicated by frequent and severe head-aches, indisposition to exert, or inability to continue muscular motion, depression of spirits, a restless and irritable state of mind, and various other symptoms, which are generally regarded as purely

nervous. We have, also, the clearest evidence that the heart and the lungs are affected by a derangement of the digestive organs, as well as the qualities and distribution of the blood—the functions of secretion, absorption, and exhalation." pp. 301, et seq.

In a subsequent part of the Inquiry Dr. H. remarks, that the qualities and distribution of the blood are readily disordered by whatever diminishes the sensibility of the sensorium, or the action of the heart; and he adds, that—

"If the contractions of the heart are less energetic than usual, the lungs will necessarily, in a short time, become congested, because the blood, not passing in a given period so frequently through them, fails to undergo its ordinary chemical modifications, and the deterioration of its properties, occasioned by this circumstance, will, of course, gradually increase its sedative effects, and render its circulation internal. As the distribution of the blood is regulated by the degree of its oxygenation, a diminution in this process will necessarily produce the effect just described throughout the whole of the internal organs. In proof of the accuracy of this opinion, when the chemical changes in the blood are impeded, the extremities and surface of the body are cold, the liver is engorged, and pain is felt on pressing any part of the abdomen, a sense of sinking or oppression is felt about the pectora, the respiration is quick and difficult, and the pulse small, as well as generally frequent. These symptoms vary according to the susceptibility of the constitution, and the severity of the cause." p. 390.

The foregoing is a brief and very imperfect sketch of the author's views in regard to the leading causes which produce a vitiation of the blood and cause its irregular distribution, as well as in regard to the more striking effects produced by these changes in the properties and circulation of that fluid. It is sufficient, however, to enable the reader to understand the peculiar features of the pathological doctrines which it is the object of the work before us to inculcate and defend. The correctness of the above views may, with very little hesitation, be admitted even to their fullest extent; and yet the general conclusion which he would seem desirous of establishing by them, that, namely, the morbid conditions and deranged circulation of the blood are in every instance the cause of all the morbid phenomena with which they are found associated, by no means necessarily follows. It does not appear to us that he has succeeded in proving satisfactorily that the changes in the properties and distribution of the blood are not themselves, in many cases at least, the result of preceding disease, and that to the latter are not, also, to be referred many of those deviations from a healthy condition in certain organs, which he has attributed exclusively to a morbid state of the blood.

The question as to the locality of disease has of late years excited a good deal of discussion in the medical profession, and unquestion-

ably the different views entertained in relation to it must have a very important influence upon the treatment pursued in many, if not in all cases. Although the opinions of Dr. H. on this subject, are not formally expressed, yet they may be gathered from the general bearing of his pathology, and from incidental remarks in different parts of the present volume of his *Inquiry*.

"It would be impossible," he observes, "were we to be guided in our decision by prevailing notions, amidst the various morbid effects apparent at the same time, or at different times in the system, to fix on any particular organ as the cause of them. The origin and extension of disease have, however, generally been accounted for by referring them to some such organ. The stomach, the lungs, the liver, and a deranged condition of the nervous system, have been each regarded as the primary seat of disease, by the advocates of different systems, all of whom, in support of their own, have brought forward a number of facts seemingly conclusive and satisfactory, so that it is extremely difficult for the scientific inquirer to determine which of the several opinions is correct." p. 32.

The foregoing remarks are made by the author when treating of the morbid effects of depressing emotions of the mind, which he has attempted to show always disorder, in the first place, the distribution of the blood, in consequence of which the internal organs generally receive a greater proportion than usual; and he further maintains that the circulating fluid is, under such circumstances, invariably less oxygenated than in its natural state.

"By such derangement and deterioration the whole system is more or less affected, as the functions of every part of it are necessarily disordered by them, but some will be more so than others, in consequence of their situation and nature; and the number and severity of the morbid conditions which may ultimately be produced, will be in proportion to the influence which the organ affected exerts on the system. That the lungs in one person, and the liver in another, should be principally diseased, is attributable to causes which it is impossible to discover, the knowledge of which, however, is scarcely essential to the establishment of sound practical views." p. 32.

In the foregoing remarks the author evidently advocates the idea that local diseases are produced by the general morbid condition of the sanguineous system. The following sentence, however, would imply that while he admits this to be true, it is with certain important modifications.

"Although it is possible for parts of the capillary circulation to be alone affected, they will always be influenced by changes in the general circulation. It cannot, indeed, be otherwise, as the former is simply the termination of the latter. A particular attention has of late years been paid to the capillary system, both in this country and on the continent, for the purpose of ascertaining its exact condition in different diseases, and various doctrines have been formed on the changes observed in it, which are either imperfect, from being founded

on too partial observation, or erroneous from a misinterpretation of the morbid phenomena apparent in various disorders. Pathologists, who have studied this subject by confining their observations almost exclusively to the capillaries, without endeavouring to ascertain the nature of the connexion existing between them and the general circulatory system in disease or health, failed to acquire clear and enlarged views of the origin, nature, and treatment of the numerous diseases which have formed the subject of their investigation." p. 124.

"All the important vital actions of the animal economy are performed by means of the capillaries, and all diseases, whether local or general, may be justly considered as seated in these minute vessels: hence, it is evident, that a knowledge of their several functions, and the relations which they hold to the general circulatory system, would be attended with the greatest advantages to the science of medicine, as the proper understanding of them is calculated to remove much of that obscurity which involves the seat and nature of an extensive class of diseases, chiefly affecting the chylopoietic viscera or the respiratory apparatus, the origin and character of which diseases cannot be at all explained on existing pathological and physiological principles. The diseases to which I allude are generally considered local, that is, situated in some particular part of the body, as the stomach, lungs, liver, or certain portions of the alimentary canal—diseases to which females and persons of sedentary habits, or melancholic temperaments, are most subject. The term extensive class of diseases may, perhaps, lead the reader to imagine that some of these are strikingly different in their origin and nature. They do, indeed, vary sufficiently in these respects to allow the nosologist to institute distinctions between them, and, if unacquainted with certain conditions of the system, common to almost all of them, he will very probably regard them as perfectly independent affections, though they are intimately related in their nature, arising generally from the same source, and differing only in the number and character of their symptoms, according to the susceptibilities of the constitution, the nature and duration of the exciting causes, and the particular kind of remedial measures employed in the treatment of them. If the stomach be the organ affected, although there may be an evident degree of disorder existing at the same time in other parts of the body, the disease is immediately designated indigestion, and treated as such; or if the lungs be considerably deranged, a derangement which is indicated by difficult breathing on slight exertion, frequent cough, and pain in the chest, either constant or occasional, the disease receives a name which refers solely to these organs, being probably regarded as the first stage of phthisis, or if the liver should be more particularly disordered than the above mentioned organs, it is said to be the seat of the disease. By adopting this confined and erroneous mode of investigating the seat and nature of the morbid phenomena, the causes of the general derangement are overlooked, though they are really the origin of these dissimilar diseases, which, however little connexion they may appear to have with each other, actually differ only in certain immaterial points, not in those constitutional conditions which are characteristic of them all. The striking symptoms of resemblance are found in the deteriorated properties of the circulating fluid, and the irregularity of its distribution, or in what necessarily follows from these two circumstances, congestion of the internal organs." pp. 128, et seq.

The views of Dr. Holland, in relation to the locality of disease, will more fully appear from his remarks on the morbid affections of the mucous membrane. To these affections so large a portion of the attention of physicians has within a few years been directed, and as, from the frequency of their occurrence, they constitute certainly one of the most important classes of diseases, we shall make no apology for the length of the following extracts. In presenting these extracts we may remark, that while we grant that most of the general propositions which they contain are founded in truth, we must be permitted to deny the correctness of many of the inferences which the author deduces from them. So far from a deranged condition of the *general circulation* being the first, or even a very early link in the chain of causation by which disease of the gastro-intestinal mucous membrane is ordinarily produced, we shall often, if not generally, find it to be one of the very last of the morbid phenomena resulting from the latter.

"The heart," remarks Dr. Holland, "propels the vital fluid to every part of the body, but the energy with which it is circulated in the different organs varies as they are more or less remote from the source of motion. This simple and incontrovertible fact will satisfactorily account for the origin of particular diseases in various situations, at the different periods of life, whether the effect of obvious circumstances acting from without, or of natural changes occurring within the system. Though the whole of the mucous membrane is supplied with blood of the same quality, yet the farther it is removed from the heart, the more easily is its circulation influenced by depressing causes, giving rise to congestion or inflammation rather of a chronic than acute form. On the contrary, the nearer any part of the mucous membrane is to the heart, the less liable is its circulation to be greatly disturbed by the same causes; and when disordered, its diseases partake rather of an acute than chronic character. It is, also, worthy of observation, that chronic diseases of the mucous membrane in the immediate vicinity of the heart, are often the consequences of an acute affection, whereas chronic diseases remotely situated from this organ, are frequently chronic from the commencement. The justness of these remarks might be illustrated by a reference to the several diseases usually found to attack the mucous membrane of the thoracic and abdominal organs. Those of the former at an early age, and in vigorous constitutions, at every period of life, are mostly acute. Those of the latter are more generally chronic. It may, perhaps, be supposed that these differences are attributable to the peculiar functions performed by the mucous membrane, and not to those differences in the conditions of the several parts of the sanguiferous system to which my observations almost altogether apply. That the functions of this membrane are very dissimilar in their nature is evident: it will, however, appear, on mature consideration, that the different degrees of vital action which they possess, (without making any reference here to the ends which are accomplished by that action,) depend on the more or less vascular state of the organs to which

they belong; or, in other words, on the quantity and quality of the blood distributed to them. A vigorous condition of the sanguiferous system is found to exist to the greatest extent in the divisions of the mucous membrane the nearest the heart, and to the smallest extent in those the most remote from it, facts which strongly corroborate the arguments previously used." p. 94.

"Several divisions of the mucous membrane are extremely liable to be disordered from their immediate vicinity to certain organs. The liver and the spleen are very often congested long before any general changes of structure occur in the animal frame, or in these particular organs, but this derangement tends to produce such changes in the alimentary canal, in consequence of the circulation throughout the chylopoietic viscera being disturbed, or its existing disorder aggravated by the derangement of the aforesaid organs. Congestion of the liver and spleen will undoubtedly exercise considerable influence on the circulatory functions of contiguous organs, and it is equally probable, that a morbid condition of the lungs will exert a similar influence on the mucous membrane of the respiratory apparatus. There are circumstances which must be duly considered, in conjunction with the observations already made, respecting the modifications in the nature and seat of diseases of the mucous membrane, caused by its situation being immediately contiguous to, or widely remote from the heart, as they undoubtedly exercise an extensive influence on the powers of the sanguiferous system." p. 96.

"The mucous membrane is liable to be affected by whatever excites or depresses the capillaries on the surface of the body, because every general modification in them will necessarily produce proportionate changes in the same system of vessels throughout the whole of the internal organs, and consequently in the capillaries of the mucous membrane. When the action of the superficial vessels is enfeebled, blood is determined to the internal organs in quantity according to the severity of the depressing cause; but if, on the contrary, it is greater than natural, this fluid, possessed of additional oxygenated properties, is equally distributed throughout the system." p. 100.

"The secretions of the bowels are generally augmented when their numerous capillaries are in a state of congestion or irritation. The latter condition may, perhaps, always depend on increased vascularity. During the operation of purgative medicines, frequently in cases of mental emotions of a depressing character, and on the application of cold to the surface of the body, the secretions are abundant. Purgatives, mental emotions, and cold, occasion the same congestive or irritable state of the capillaries of the bowels. The action of heat is the converse of that of cold. The former stimulates the superficial capillaries, in consequence of which, they receive more blood than usual, a modification in the sanguiferous system which withdraws from the internal organs a quantity of the vital fluid, and thus facilitates its chemical changes in the lungs, giving to it additional oxygenated properties, which maintain in vigorous action the powers of life long after the primary exciting cause has subsided." p. 103.

The leading doctrines set forth in the preceding sentence, will admit of very considerable dispute. There is no evidence, whatever, that when a sedation is produced in the external capillary tissue by cold, that there is an increased amount of blood determined to the

capillary tissue of the mucous membrane, or on the other hand, that when the external vessels are excited by heat, there is a diminished quantity of blood contained in the capillaries of the mucous membrane, as well as decreased activity of these vessels; on the contrary, all the phenomena which result upon the application to the surface of cold or heat, prove, we conceive very clearly, that the sedation or excitement which takes place on the vessels of the skin, occurs also to a certain extent in the vessels of the internal mucous membrane.

"The mucous membrane," according to our author, "possesses no relations to the circulatory system, which differ much from those of the abdominal viscera, and hence when the motory organs of the blood are disordered, the functions of this membrane, in common with those of the other chylopoietic viscera, are liable to be deranged. It does not, however, follow, admitting that each of these organs, when thus disordered, receives an additional quantity of blood, that they will exhibit an equal degree of morbid derangement. As the different organs are not all possessed of the same delicate structure, and do not exercise the same important functions, it is clear that though the whole animal system may be disordered, they will not all be deranged to the same extent." p. 106.

Dr. H. remarks, that a knowledge of the different agents engaged in the propulsion of the blood, which are capable of disturbing the circulatory apparatus, and of the manner in which they act, at once exposes and accounts for the fallacy and imperfection of the views of Broussais respecting the nature and origin of gastro-enteritis, dysentery, cholera, and other diseases.

"In the consideration of these disorders, his attention was fixed too exclusively on some one organ, regarding it as the cause of the whole mischief; whereas its morbid condition is generally an effect coëxisting with many other similar effects, which were either altogether overlooked by him, or regarded only as originating in the derangement of the particular organ to which he was, at the time, giving a too exclusive attention, whether it happened to be the stomach, or any other of the abdominal viscera." p. 107.

The observations of our author in relation to the usual terms, functional and organic, so commonly employed by the English physicians to denote a difference in the nature of diseased action, are in the main extremely pertinent.

"There are few terms," he remarks, "more frequently employed in medicine than functional and organic, as descriptive of different kinds or degrees of disease; but it may be inferred from the indefinite and various notions attributed to them, that the conditions of the system, which they are supposed to indicate, are very imperfectly understood. The general observations made on this subject, as well as the opinions contained in the best medical treatises of the present day, seem to convey an idea, that the function of an organ is somewhat independent of its structure or physical conditions, for it is commonly said, in speaking of many diseases, that they are *only* functional. Now it is impossible

for functional disorders of any kind to occur without being the consequence of organic changes. The term organic, in contra-distinction to functional, is conceived to imply a *manifest* alteration in the structure of an organ—such as a diminution or enlargement of its substance, or some evident change in its appearance. It cannot, however, be doubted, that unequivocal modifications may take place in the numerous capillaries of an organ, such as a total or partial obliteration of many of them, and yet, on an ordinary examination, no traces of such modifications may be clearly perceived." p. 403.

"Functional disorder is, in most cases, a diseased action of the capillaries, the structure of which is almost sure to be more or less affected at the time, although it is not in our power to demonstrate the fact. Nature has not been so parsimonious in her gifts, that even a permanent diminution of them in the animal economy necessarily becomes immediately manifest in the less perfect operation of the vital powers, and, therefore, the absence of direct evidence cannot be considered as proving that organic changes do not succeed every striking functional derangement. According to this view, it is clear, that diseases, generally considered functional, are unquestionably organic." p. 405.

"The terms functional and organic, may, indeed, be employed to describe different degrees of disease, but not, as they have hitherto been applied, to express actual differences in the nature of the diseases themselves, which cannot be clearly ascertained to exist." p. 406.

"It is probable that some organs must sooner recover their usual energies, after what may be called functional disturbance, than others, in consequence of structural and functional differences, which it may not be uninteresting briefly to examine. Organs whose office it is to secrete, and whose secretions remain in contact with the membrane from which they are derived, are perhaps more liable to suffer severely from every functional attack, than others which do not secrete a nutritious fluid, or one which remains in contact with the secretory vessels. In the case in which the fluid continues in contact with the membranous surface that produces it, whenever it is poured out, either morbid in quality, or too profuse in quantity, it is calculated to aggravate the disease of the capillaries, and to prolong its duration much beyond the operation of the primary derangement. But in those instances, on the contrary, in which the fluid is removed from the vessels that secrete it, they are not particularly liable to have their existing disease increased in severity, by the injurious influence of such fluid, and hence, vessels so circumstanced, will more easily recover their natural action, than those which are continually irritated by the contact of the morbid matter secreted by them." p. 409.

We do not profess to have any very clear conception of the above explanation of the author, as to the reasons why certain parts of the body are more subject to organic disease than others. In whatever manner it may be understood, it would appear to us, however, to be a mere assumption unsupported by facts derived from the ordinary cases in which manifest alterations of structure are produced by disease.

"Organic diseases," it is further stated "may arise from two very opposite

causes, a deterioration of the vital fluid and its consequent internal distribution; or a too excited state of it, arising from its highly nutritious and stimulating qualities, and its consequent accelerated circulation. The former condition of the sanguiferous system produces disorganization, by giving to the capillaries an undue proportion of imperfectly oxygenated blood; the latter occasions permanent structural changes in the heart and arterial system, such as an enlargement of substance or ossific depositions from too much nourishment being furnished to them." p. 409.

The term functional derangement is very generally applied to the frequent attacks of head-ache, vertigo, &c. occurring in connexion with a diseased state of some remote organ, and supposed by the majority of physicians to be sympathetically produced by the latter. But these affections of the brain, according to Dr. H. can in most instances, be shown to arise from a disordered action of the capillaries of the brain, coexisting with a similar disorder in this system of vessels, extending throughout the whole body, and arising most probably, from irregularities in the distribution and properties of the blood.

"Indistinct, weak, or impaired vision has so frequently coexisted with derangement of the stomach, that it has, in numerous instances, been considered to arise from the morbid action of this organ, (a sympathetic connexion being supposed to be maintained by certain nerves, between the stomach and the brain,) and has been treated as if such were its origin; and the success attending the practice suggested by this view of the subject, has been generally regarded as a proof of its correctness. That such a connexion exists, and that it may sometimes produce effects which cannot apparently be justly referred to any other cause, will not be denied; decisive evidence can, however, be adduced to prove, that in the most remarkable cases of functional disease, the particular morbid effects cannot be traced to any extraordinary influence transmitted along the course of the nerves from the stomach to the brain; but, on the contrary, to a morbid state of the capillaries of this organ, originating in the disordered condition of the sanguiferous system, which arises from indigestion and its attendant train of diseased actions. Instead, therefore, of regarding the stomach as the cause of numerous inexplicable sympathies, transmitted through the nerves to the brain, is it more correct to consider both organs in many instances, as similarly circumstanced with respect to the condition of the capillaries, from being equally affected by the derangement of the circulatory system; and on those occasions in which the stomach is evidently the cause of various disorders, its injurious influence is chiefly referable to the modifications produced by it in the properties and distribution of the blood." p. 412.

In the foregoing extract, and in various other portions of his inquiry, the author speaks of a general diseased condition of the capillary system, and of the readiness with which this may be proved to exist; but so far as we have been able to discover, he has not succeeded in establishing the fact, that in any of the instances to which he alludes

such a condition of the general capillary system does exist, nor has he rendered it probable that in any of the ordinary forms of disease it is even possible that it could exist.

It would be very interesting to follow Dr. Holland step by step in his explanations of the effects upon the animal organism resulting from exercise, heat and cold, mental emotions and impure air, and of the manner in which each of these agents acts as a morbid cause, which constitute the subject of the ninth, eleventh, twelfth, thirteenth and fourteenth chapters of the present inquiry. But to do this would extend our review beyond the limits to which it is necessarily restricted. We shall, therefore, be obliged merely to state briefly his opinions in relation to the above subjects, without attempting to enter into a detail of the facts and arguments upon which these opinions are based.

"*Exercise*," it is very properly remarked by Dr. H. "whether gentle or severe, accelerates the circulation, so that the mass of blood, contained in the body, passes, in a given time, more frequently through the lungs, than during an unexcited state of the system, and receives a proportionate increase of vital energy. This is one important and manifest modification, produced by exercise, in common with every cause that occasions an invigorated motion of the blood; but there may be other changes besides those purely chemical, by which the qualities of this fluid may be considerably improved.

"*Exercise*, by invigorating the body, directly influences the functions of the abdominal organs, in consequence of which, their several secretions are poured out more abundantly, and with greater regularity than usual; an effect which may be considered, in some degree, though not entirely, independent of the chemical changes induced in the blood; for as soon as the circulating fluid has acquired additional stimulating qualities, and is propelled by the heart with increased vigour, the chylopoietic viscera, generally, are excited to greater action, and this effect continues, long after the cessation of the cause which, in the first place, produced it. The blood is not only improved in its chemical properties by passing through the lungs more frequently than usual, but it also acquires additional nourishing qualities from the more abundant and healthy contributions furnished by the digestive apparatus." p. 349.

"When, however, exercise is continued sufficiently long to occasion great fatigue, the properties of the blood are deteriorated, and sometimes to such a degree, that it does not coagulate when drawn from a vein. Moderate exercise is productive of additional vital properties, but when excessive, it lessens those properties. An excited condition of the system not only tends to invigorate the powers of life, but also to exhaust them, by accelerating the expenditure of the nourishing properties of the blood, an effect necessarily produced by augmenting the different excretions of the body, so that if exercise is severe, this expenditure being proportionably great, the circulating fluid is at last deprived of those properties which enable it to perform its numerous and important offices. The chemical changes in the lungs may be considered as rendering the blood nutritious, by imparting to it oxygen, and extracting from it carbon; but, if it has become exceedingly impoverished, from abundant excretions, the inspired air

will not modify it to the usual extent, or, in other words, will be incapable of supplying the vital properties, which have been gradually dissipated by the inordinate activity of the excretory functions. It is, moreover, probable that under these circumstances, the distribution, as well as the qualities of the blood, is very much disordered, so that this fluid may be unfavourably situated in the lungs for proper chemical action, which will, also, in part, explain the cause of its deterioration." p. 352.

The influence of *heat* upon the system Dr. H. believes to be chiefly, if not altogether, confined to the production of highly oxygenated blood. The superficial capillaries are stimulated by it to increased activity, which, by withdrawing blood from within, promotes, according to his views, its more perfect chemical changes in the lungs. Heat possesses, he remarks, this influence in common with bodily exercise, exhilarating states of mind, internal and external stimulants and emetics, all of which excite an equable distribution of blood, and consequently, promote its more complete oxygenation. The agency of *cold* produces opposite effects; it enfeebles the circulation on the surface of the body, and, consequently leads to internal congestion. Hence the blood not undergoing a sufficient change in the lungs, becomes deteriorated. The blood is driven by the application of the cold from the surface and extremities, and from its diminished oxygenation it does not stimulate the heart to vigorous action, whereby its distribution is considerably circumscribed. Cold, however, acts with different degrees of severity on the system, according to the character of the circulation existing at the period of its application; the susceptibility to it being always in inverse ratio to the quantity of blood circulating, at any one moment, on the surface of the body. An increased amount of blood circulating in the external capillaries, necessarily, supposes more stimulating properties in that fluid, and a more vigorous circulation.

In his "Experimental Inquiry," Dr. H. has attempted to show, that all violent *mental emotions* act on the system wholly through the respiratory function, and, from the changes which they effect in it, occasion important modifications in the distribution and qualities of the blood. Exhilarating emotions invariably promote the general diffusion of the blood, and consequently diminish the quantity circulating at any one moment in the lungs, thus necessarily conducing to its more extensive chemical changes; they never fail, also, to excite various kinds of muscular contractions besides those belonging to the respiratory apparatus, which also accelerate the circulation, and improve the chemical changes of the blood.

"Depressing emotions may be divided into two classes; those which are strong, but transient, such as are experienced in cases of fright or sudden sur-

prise; and those which, though gentle, are permanent, such as are felt in the ordinary cases of mental despondency. They both produce the same general effect—a derangement in the properties and circulation of the blood: the one, determining a considerable portion of it to the internal organs, either completely arrests the action of the heart, or renders it irregular and feeble; the other, necessarily lessening the frequency of all expiratory acts and withdrawing the individual from cheerful society, lively amusements, and whatever is capable of freely exercising and invigorating the body, greatly disturbs the functions of the sanguiferous system. That the blood, under these circumstances, is disordered both in its qualities and distribution is proved by the usual symptoms attending depressing emotions, when they have continued for a considerable time, such as palpitation of the heart, cough, or difficulty of breathing, a small and frequent pulse, pain in the head, diminution in the production of animal heat, and an evident derangement of the chylopoietic viscera." p. 383.

In regard to the morbid effects of *impure air*, Dr. H. remarks, that the qualities and distribution of the blood are easily disordered by whatever diminishes the sensibility of the sensorium, or the action of the heart. When impure air is inhaled, it acts as a direct sedative, and its influence is exerted on the animal system, principally in two ways; 1st, by enfeebling the action of the heart; and 2dly, by lessening the sensibility of the brain.

"Whether impure air is absorbed by the lungs, the skin, or the mucous surface, the blood receives it and transmits it to every part of the animal system. Its morbid agency will, however, be chiefly exerted on the heart and the brain, which will be simultaneously, but, perhaps, unequally affected by it. It is allowed by most physiologists, that the capillaries exercise considerable power in the circulation of the blood: the functions of these vessels will therefore be deranged, as a necessary effect not only of the disordered action of the heart itself, but also of the diseased condition of the blood, which influences the contractions of this organ. The liver, the spleen, the kidneys, and the mucous membrane of the gastro-pulmonary and genito-urinary organs may be incapacitated from performing with ordinary energy their several operations, as a necessary consequence of the weak and disordered state of those organs, without the blood and its distribution being immediately and extensively injured. The respiratory organs are simply for the purpose of exposing the blood to the action of the inspired air, and as long as the quantity exposed is not greater than natural, the ordinary chemical changes are effected, provided the air possesses its proper qualities; if not, as before remarked, it will enfeeble the action of the heart and lessen the sensibility of the sensorium.

"The animal system may be so gradually and slowly injured by the habitual breathing of impure air, that this may not appear the cause of the functional and organic derangement which ultimately occurs."

"When its influence is exerted gradually and slowly, every part of the human frame becomes deeply involved in the derangement induced, and though the stomach, the liver, or the lungs only, may seem effected, it is, however, just to regard the body generally as diseased, its several organs being disor-

dered in different degrees from their greater or less susceptibility, or the importance of the functions performed by them. When its operation is sudden and violent, death or some severely morbid effect is immediately produced. In this case, the moving powers of the blood are arrested, or exceedingly depressed, before the rest of the system has had time to be equally implicated in the mischief; though, even under these circumstances, the whole of the animal economy will necessarily be deranged." pp. 392, et seq.

*Pain*, which is occasionally the cause of disease, produces this effect, according to Dr. H. by occasioning changes in the respiratory functions, by which they are either entirely arrested or seriously disturbed—changes which he conceives sufficient to explain the effects produced, whether these be death or only temporary disorder.

Having now presented a very general, but we trust intelligible view of the leading pathological doctrines advanced by our author, so far, at least, as they are developed in the work before us, the next step would properly be to ascertain in what manner these doctrines are applied to the explanation of the phenomena of individual diseases, but on this point we shall have to be extremely brief, as well from the imperfect details relative to it, which are presented to us in the present volume of the Inquiry, as from the necessity of bringing our review to a close.

On the subject of *inflammation* we have the following remarks in different parts of the work. Speaking of the liability to acute diseases in persons who indulge in generous living, the author states as follows:—

"Acute inflammation arises chiefly from two circumstances, viz. the naturally excited state of the whole animal system, produced by the qualities of the blood, and the two stimulating properties of this fluid. When blood is transmitted, either by external or internal agents, in too great quantity to any particular organ, acute inflammation is liable to be produced by the strong reäction succeeding the determination of it—a reäction attributable to the disturbance of the capillaries, which are possessed of great excitability, and are supplied with blood calculated to increase it when the functions of these vessels are disordered. It is difficult to convey a clear idea of what is meant by reäction, in the sense in which it is here employed. We know, however, that by using friction on any part of the body, for a considerable time, we produce inflammation. Now, in this case the capillaries directly affected receive more blood than usual, or, in other words, the natural relations existing between these vessels and the circulating fluid, are disturbed, and this disturbance causes a reäction between them, from which arise the phenomena of inflammation.

"The condition of the capillaries thus affected are, perhaps, similar to those produced by an undue determination of blood in any other manner." p. 223.

"It is not in our power to ascertain the exact condition of the capillaries in acute and chronic inflammation; all we know is, that they are at one time congested, and that, at another, the blood circulates in them with accelerated force. To attempt to discover the particular vital changes produced in the constitution of the vessels themselves, by the process of inflammation, or to

show how such changes modify the nature and duration of the disease, would conduct us into the regions of speculation." p. 133.

"In all acute inflammations the blood is too vitalized for the well being of the animal system."

"In the healthy and unexcited state of the body, according to our author, the blood is chiefly found in the internal organs. When inflammation takes place the energies of the system are roused, so that the blood is more equally diffused, and in consequence of its undergoing extensive chemical changes in the lungs, its general diffusion is continued." p. 465.

Dr. H. considers that the doctrine of Broussais and other pathologists, which teaches that nervous irritation invariably precedes an inflammatory or congestive condition of the capillaries, is extremely questionable; in many cases he pronounces it to be obviously incorrect, while he conceives that it does not in any instance appear to admit of decisive proof.

Speaking of *congestion*, which, according to the author, is the state of the capillaries in all cases preceding inflammation, he remarks, that it arises from various causes, all tending, however, to disorder those functions which oxygenate and circulate the blood.

"There is little difficulty in discriminating between acute inflammation and congestion, but a great difference of opinion may certainly exist respecting the phenomena which characterize chronic inflammation and congestion. It is scarcely possible to confound chronic inflammation which has existed long in any gland, joint, or organ, with those disordered conditions of the system which the term congestion, as used in this Inquiry, is intended to indicate. It may, however, be questioned, whether that state of the internal viscera existing in cases of typhus or continued fever be inflammation or congestion, though both will perhaps be allowed to coexist. The internal organs under such circumstances, are generally more or less congested; some, or perhaps particular parts of them may, from peculiar causes, which it is unnecessary in this place to investigate, be in a state of inflammation. Broussais, from having frequently observed structural modifications in the chylopoietic viscera, in cases of fever, dysentery, or cholera, attributes the origin of these diseases to an inflammatory process. These modifications, however, are the effects of causes, with the operation of which he seems to be unacquainted, and coexist with much general disorder, the exact nature of which he does not attempt to explain." p. 140.

*Chronic inflammation*, Dr. H. remarks, whether arising from an acute affection, or the slow operation of depressing causes, is preceded by congestion of the capillaries, and is cured, or ameliorated according to the degree of our success in removing the surcharged state of the vessels. That state of the internal organs generally which takes place in females, in whom the uterine functions are disordered, the catamenia being either wholly or partially arrested, the author conceives may be properly designated by the term *congestion*, not meaning, however, to deny that chronic inflammation may, at the same time, exist in several organs. Congestion, which first

takes place in the series of morbid actions preceding the derangement of those functions, affects not merely one part of the system, but more or less the whole of it, as the properties and circulation of the blood are invariably disordered by every such derangement.

"Chronic inflammation appearing at this time, in one organ, or in several organs, arises out of the congestion generally existing, and may, consequently, be considered as the second stage in the series of morbid changes, a phenomenon which has hitherto tended, in a most extraordinary manner, to conceal the true nature of the morbid state of the vital powers, and thus led to the employment of remedies which apply rather to the existing local diseases, than to the generally disordered condition of the system in which they originate." p. 142.

"Chronic inflammation may, in some instances, less obviously arise from the congestion of the internal organs than in the circumstances here specified, being, in such instances, produced by causes which affect one organ alone, though it may yet occasion, by its severity or long continuance, that generally morbid condition of the vital powers in which it more frequently appears to originate."

"From the foregoing remarks on chronic inflammation and congestion, it will appear how difficult it is to offer a definition which clearly separates the two diseases, being, as they often are, intimately blended; the one continually passing into the other in the greater number even of those cases, in which, on a superficial examination, they seem to exist uncombined.—Congestion cannot continue long without producing chronic or acute inflammation, the existence of either, but particularly the latter, being generally supposed to be indicated by local pain and fever.

"Daily observation proves that chronic inflammation may make considerable progress, without producing fever or pain sufficient to indicate its existence, or at least to render the patient acutely sensible of it; it is also equally true, that in many cases, in which congestion alone prevails, there is often much pain, which comes on so suddenly, and is removed so easily, that we can scarcely refer it to inflammatory action. It is probable that the sensibility of an organ may be much increased by a condition of the capillaries, which could not justly be designated inflammation, though the truth of this opinion may be denied with seeming plausibility by those who are disposed to attribute every such phenomenon to inflammation. Congestion of the internal viscera undoubtedly exists in cases of typhus, continued and intermittent fever, as well as in severe attacks of indigestion, and in the greater number of instances chronic inflammation also coëxists with it, though rather as the effect than the cause of it. Congestion, altogether uncombined with inflammation, immediately succeeds violent depressing emotions, but, if it continue long, it speedily produces inflammation." p. 143, et seq.

"Broussais has endeavoured to show that *idiopathic fevers* have no existence, i. e. fevers not necessarily connected, as they have been hitherto commonly regarded with inflammation; and though his reasoning on this subject is, on the whole, just, he lays down no general principles, the result of an intimate acquaintance with the laws of organic and animal life, which satisfactorily explain the origin of the striking diversities in the character of fevers—the nature of

the causes which influence their progress and termination, whether this be favourable or otherwise, or which suggest a proper and efficient mode of treatment. His errors on these important subjects may be traced almost altogether to his limited knowledge of the relations subsisting between the more vital organs of the body, and the functions of the circulatory system." p. 108.

Many portions of the work of Dr. Holland, that we have been unable, from the limits to which we are unavoidably restricted, particularly to notice, are replete with interest, and well deserving of an attentive study. For notwithstanding, throughout the whole volume, every thing is made to bend to his favourite theory of the influence of the blood, relative to its properties and mode of distribution, as almost the sole physiological and pathological agent, yet his observations, on many of the subjects connected with his inquiry into the principles of medicine, are often extremely pertinent, indicating a close attention to the phenomena of health and disease, and capable, in not a few instances, of a very important practical application. These remarks will apply generally to his chapter on the influence of climate, habits and temperaments, on the production and character of disease, and the manner in which a knowledge of this influence ought to modify the principles of treatment; his chapter on animal heat, and the two concluding sections of the work, which treat of nervous irritability.

That we do not agree with the leading pathological views of our author, will be readily inferred from the few remarks we have ventured upon, in relation to some of his doctrines. It is extremely difficult, however, to offer any general opinion in regard to the views which he has advanced in the volume before us, as well for the reasons alluded to in the commencement of this review, as from the frequency with which the author has contrived to blend truth with error. Very many of his propositions must unquestionably be admitted as correct, but others intimately connected with these, as well as the general inferences which he brings them forward to establish, are, we conceive, as evidently erroneous. The principal errors into which Dr. Holland has fallen in his pathological reasoning arise, in our opinion, from precisely the same source to which he attributes those of Broussais, a limited knowledge, namely, of the relations subsisting between the more vital organs of the body, and the functions of the circulatory system. We are ourselves far from being ultra Broussaists—we admit that many errors and imperfections exist in the system of medicine advocated by the physiological school, but we are certainly not convinced that they will in any degree be obviated and supplied by the system of pathology which Dr. Holland is desirous of establishing.

D. F. C.